Commodore

The Transactor

comments and bulletins
concerning your
COMMODORE PET

BULLETIN # 1
Apr. 30, 78

This is the first news bulletin which will be issued up to 12 times a year to members of the PET user groups throughout the world.

Enclosed is a form which enables you to join the Canadian PET User Club. Whether you own a PET now or intend purchasing a PET in the future, or whether at this stage you are not intending to purchase a computer, but are interested in the developments of personal computers, the following are some of the benefits you will get by joining the CPUC:

1. Information on software available

2. Information and specifications on peripherals from Commodore and other people.

3. Information on problem shooting PET bugs and a variety of other information.

Below is a free copy of our first bulletin.

Now we have some good news.

Enclosed is a list of cassette tapes that are now available. We've given brief descriptions in each case. And indicated the prices.

These programs are only the beginning. From now on, approximately once a month, Commodore will be issuing a "new release" bulletin. By the year's end we hope to have literally thousands of programs.

Within 30 days, there will be available in one packet what we consider to be the final documentation for the PET. All this will be inc. at no charge, of course with each PET.

This will include:

A revised "Introduction to Your PET." An expanded and improved version of the booklet you've already received.

"PETALK," a compendium of material concerning your PET, including information on interfaces, the USR function, BASIC interpreter and operating system, cassette files, BASIC bugs, the IEEE 488 interface and available device.

"Squiggle" and "Bigtime," two programs on tape complete with an excellent text booklet that tells you how the programs were created, step by step. Really, an excellent instance of teaching by example.

The Machine Language Monitor. At last. On the other si of the "Squiggle/Bigtime" tape also accompanied by an excellent text.

While we have your attention, let's talk about peripherals.

The second cassette recorder, a great help in data storage, will be available soon at $120.00.* Please allow four to five weeks.

A special impact printer, printing up to 80 characters per line (remember, your PET can accept up to two 40 character lines per statement) on 8½" wide paper, continuous roll or folded. The tentative price is $800.* Expected delivery to begin in May.+ We'll send you tighter specs and an illustration next month.

A floppy disc system is in the works. It should be ready for announcement in May, with delivery scheduled for late summer. Also about $800.

*Approximate price in Canadian dollars.

+USA delivery - Add 2 months for CSA approval in Canada.

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To receive future copies of CPUC information bulletins, please return this form with your cheque for $10 annually renewable, to CBM, 3370 Pharmacy Avenue, Agincourt, Ontario, M1W 2K4.

NAME.....

COMPANY (if applicable).....

ADDRESS.....

.....

Receipt required Yes ☐ No ☐

(Invoices cannot be issued for the $10 annual fee).

Welcome to the Canadian PET Users Club and in this issue, we have some hints on graphics animation, details of BASIC interpreter timings and memory usage, and of ASCII codes plus much more.

Printed in this and all subsequent issues, there will be a list of software available through the Users Club. The original list is small and Commodore Systems generated, but we hope to add many programmes in the near future. We intend to form a "Common Library" which will contain programmes submitted by PET users worldwide and we hope you will contribute. The contents of the Library will be printed in each issue. Anyone interested in the terms and conditions of royalties paid by Commodore for programs accepted by Commodore should write to:

The Software Manager,
Commodore Systems Division,
901 California Avenue,
Palo Alto, California 94304,
U.S.A.

A SHORT NOTE ON MOVING THINGS

Difficulty has been experienced by some of our users in moving the cursor under programme control and questions have been asked about how graphs and plots such as sine curves can be displayed.

As you probably already know, cursor control characters in quotes when printed will cause the cursor to move accordingly. If your experiments so far with this technique are giving slightly odd results, do make sure that you are terminating your print statement with a semi-colon. Failure to do this will cause the machine to output a carriage return/line feed at the end of the print statement, leaving the cursor just where you don't want it.

On the subject of plotting, the basic trick used with this type of graphic system is to first create strings full of cursor movement characters and then access parts of them using MID$, etc. dynamically.

For a really good example of the use of this technique, I suggest you have a look at the technique used in our biorhythm programme.

BITS AND PIECES

ARE YOU READY?

There have been reported mysterious occurences of the out of data error when editing and fiddling about in general.

This is not a bug, but is due to pressing RETURN whilst the cursor is over the READY prompt. The machine interprets this as READ Y and as there is usually no corresponding data statement around we get the error.

REDO

It must be remembered that when RETURN is pressed, the machine consumes everything on the same line as the cursor, so even if you have correct information at the beginning of a given line, a single character of an incorrect type far over on the right hand side of the screen on the same line is likely to cause problems. A rather problematical example of this situation occurs if you try and put up a graphic form or set of boxes on the screen and then under programme control ask for data with an input statement, e.g.

NUMBER ?

When the number is typed and RETURN is pressed, the graphics character making up the right-hand side of the box will be entered as part of the inputting data. In the case of input to a numeric variable, the graphics character is of course non-numeric and not allowed and will give the error ? Redo from start, so you must always leave such boxes open ended.

INVERSE TRIGNOMETRIC FUNCTIONS

Here are a couple of handy methods of obtaining are sine and arc cosine (remember, the result will be in radians).

```
ASNX = ATN (X/SQR(1-X↑2)
ACSX = ATN (SQR(1-X↑2)/X)
```

For those of you who are used to working in degrees, here are some handy user defined functions:

```
DEFFNS(V) = SIN(V/(180/π))
DEFFNC(V) = COS(V/(180/π))
DEFFNT(V) = TAN(V/(180/π))
```

These are three user defined functions which when called with arguments and degrees will give the appropriate results. In these examples V can be any variable but if all three are defined in the same programme, you must usė three different dummy variables.

```
EXAMPLE:        PRINT FNS(30)
```

Result of this will be .5. Notice that the argument for FNS, or FN anything for that matter, can be either a variable or numeric constant. Also, after a programme containing these definitions has been run, these functions may be called using FN in the direct mode, that is, from the keyboard directly without being in a programme.

SECOND CASSETTE UNIT

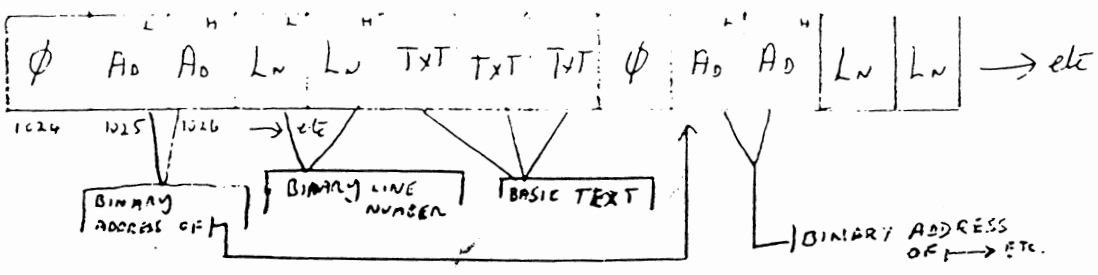
The second cassette unit with lead and plug ready to go straight onto the second cassette port on the rear of the PET, will be available from the beginning of June at a cost $130.00 plus P.S.T.

6502 PROGRAMMING MANUALS

This really excellent MOS technology generated 220 page manual will be available at a cost of $12.00 plus P.S.Tax from the beginning of May. This manual, if read carefully from the beginning, is an excellent guide to microprocessor programming in general, as well as being a first rate 6500 reference book. It is worth mentioning here, that for those of you who are interested in developing their knowledge and expertise in the field of microprocessing and cannot, at this point of time, afford a PET, then they might, perhaps, look at a KIM, a valuation board, which sells for $320 and contains a keyboard, display, 2K ROM plus 1K RAM, cassette interface, 2 timers and much more. This valuation board is available in Canada from Computer shops or Commodore Business Machines Limited, 3370 Pharmacy Avenue, Agincourt, Ontario M1W 2K4.

BASIC PROGRAMME STORAGE

Below is a diagramatic representation of the method used by the CBM basic interpreter for storing programmes in memory.



EDITING

There is an interesting property of the screen edit routine which gives rise to the following effects:-

If you insert using the INS key, more spaces than you type in characters, the DEL key must be pressed twice the number of times there are spare spaces. E.g. If you insert six spaces in a middle of a line and only type in four new characters, the first two presses of the DEL key will produce inverse characters which will disappear on the next two presses. Remember, the INS key will move all characters including the one under the cursor to the right, whilst the DEL key will delete the character on its immediate left.

INTERRUPT STRUCTURE

Interrupts (including Break or Software Interrupts) are handled by software polling.

When the processor recognizes an interrupt it vectors through FFFE, FFFF in ROM to a routine that first inspects the processor hardware (IRQ line low).

If it was caused by a Break instruction, a Jump Indirect is executed through locations 021B, C. If by a hardware interrupt then a Jump Indirect is taken through locations 0219, A.

These locations being in RAM may be user-modified to point to extra user code ahead of normal interrupt processing.

Note, however that the IRQ pointer is used by the cassette routines and should be restored to standard values before the cassette Save or Load functions are called.

Various sections of the I/O chips can be set up to cause interrupts through the IRQ line.

Example: POKE 59470,2 enables a negative edge on the user port CAL line to cause an interrupt.

However, have your code set up to handle it when it happens!

Also note that each pass through the regular interrupt code increments the time register.

PET Matrix-Decoded Keyboard

See 515 & 516 in table below

	8	7	6	5	4	(3)	2	1
64	!	"	#	$	%	'	&	\	(	)	←	ho	↑↑	↕↔	de
48	Q	W	E	R	T	Y	U	I	O	P	↑	7	8	9	/
32	A	S	D	F	G	H	J	K	L	:		4	5	6	*
16	Z	X	C	V	B	N	M	,	;	?	re	1	2	3	+
0	sh	rv	@	[	]	sp		<	>	st	sh	0	.	-	=
	16	15	14	13		12	11					10		9	

Interesting Locations Accessible from BASIC

Location (decimal)	Contents
H L 225, 224 226	Byte address of screen line with Cursor Character position of Cursor (0 to 79)
515	Matrix-coordinate (row+column) of last key down 255 if no key down
516	1 if shift down, 0 if shift up
525 526-534	No. of characters in Keyboard Buffer Keyboard Buffer
578 to 587 588 to 597 598 to 607 610	Logical numbers of open files Device numbers of open files Read/write modes of open files How many open files
512, 513, 514 518, 517 59465, 59464	Clock that increments 60 times a second Clock that increments 30 times a second? Clock that decrements every microsecond
59456	WAIT 59456,32,32 waits for vertical retrace of display
64824	SYS(64824) simulates power-on reset
59469	Interrupt Flag Register; e.g., to input user port CA1: I=PEEK(59469) AND 2: POKE 59469,I: IF I=0 THEN *CA1 low*
59411	IEEE PIA B Control, e.g., to run cassette#1 motor N jiffies: 100 POKE 59411,53: T=TI 200 IF TI-T<N GOTO 200 300 POKE 59411,61 ADVICE: *Run motor at least 3 jiffies per 191 output chars*

TIMING TABLES

BASIC STATEMENTS AND I/O

CONSTRUCT	APPROX. TIME (MILLISEC)
FRE	1 to 10
PEEK, POKE	1
TI$	3 to 4
TI	1
GET	1 to infinity
POS	1
PRINT X or PRINT	15 to 19
PRINT X$;	14 + LEN (X$)/2
READ X and DATA 3	9
REM	0.2 to 2
RESTORE	0.3
TAB	2
SPC(N)	1 + 0.6*N
FOR 1 = ... NEXT 1	4.0 + (1.6 each)
STEP	1.3
IF	0.4
GOTO or GOSUB	1.1
ON A GOTO or GOSUB L_1 ..... L_M	0.5 + (0.3*A) + (0.2*M)
RETURN	0.9

Using colon,:, saves 0.6 over new line.
SAVE or LOAD
15 sec + (2 sec per 100 char)
i.e. 500 baud.

STRING FUNCTIONS

FUNCTION	APPROX. TIME (MILLISEC)
+	0.5 + (0.2 per char)
ASC	1
CHR$	1.2
LEFT$, RIGHT$	3 + (0.025 per char)
LEN	0 to 8
MID$	4 + (0.025 per char)
STR$	7 to 10

STRING FUNCTIONS (Cont'd)

FUNCTION	APPROX. TIME (MILLISEC)
VAL	1.3
=,⟨⟩,⟨,⟨=,⟩,⟩=	3 to 4

ARITHMETIC FUNCTIONS

FUNCTION	APPROX. TIME (MILLISEC)
ABS	0.6
ATN	42
COS	27
EXP	27
INT	1.2
LOG	23
RND RND (-1)	1.0
RND (0)	0.9
RND (1)	4.1
SGN	1.1
SIN	25
TAN	50
user FN	2.4

ARITHMETIC OPERATORS

SYMBOL	APPROX. TIME (MILLISEC)
0↑B, 1↑B	0.3
2↑B	32
else	50 to 100
/ 0/B, A/1	0.5
else	2 to 5
* 0*B, A*0	0.4
else	1.5 to 3
+	0.3 to 1
-	0.3 to 1
=,⟨⟩,⟨,⟨=,⟩,⟩=	0.7
AND, OR	1.7
NOT	1.4

VARIABLES AND CONSTANTS

ITEM	APPROX. TIME (MILLISEC)
A,A$,A =,A$ =	0.7 to (0.7 + nv*0.1) nv = no. of variables in program
AA,AA$,AA =,AA$ =	0.2 more than above
A%	0.3 more than A
A%=	0.6 more than A =
999	1 per digit
.999	0.7 + (4.2 per digit)
E16	0.2 + (0.4* exponent)
E-16	0.2 + (3.0* exponent)
"ABCDE"	(0.6 to 0.7) + (0.02 per char)
M (I,J....)	(1 to 1.5)* (no. of subscripts)

TIMING PROGRAM

```
100   N = 300
200   T1 = T1
300   FOR 1 = 1 TO N
400   REM PUT TEST CONSTRUCT HERE
500   NEXT 1
600   T2 = T1
700   FOR 1 = 1 TO N
800   NEXT 1
900   T3 = T1
1000  PRINT 1000* (2*T2-T1-T3)/(60*N)
1100  END
```

MEMORY USAGE (IN BYTES)

BASIC 1028 (1/O buffers, tables etc)
each statement
    4 for line number and following space, regardless for the line number
    1 for each BASIC keyword
    1 for each other character, including RETURN
each variable with a value assigned, regard less of spelling or value takes 7 bytes; for string variables, add the length of the string
each array (N.B., size includes 0th element)
    take f* (size + 1) + (2 per dimension) where f=5 for floating point arrays, f=2 for integer arrays, and f=3 for string arrays.
The system slows down noticeably when memory is neary full.

Character	ASC/CHR	PEEK/POKE	Character	ASC/CHR	PEEK/POKE	Character	ASC/CHR	PEEK/POKE	Character	ASC/CHR	PEEK/POKE
	0		@	64	0		128			192	64
	1		A	65	1		129		,a	193	65
	2		B	66	2		130		,b	194	66
	3		C	67	3		131		,c	195	67
	4		D	68	4		132		,d	196	68
	5		E	69	5		133		,e	197	69
	6		F	70	6		134		,f	198	70
	7		G	71	7		135		,g	199	71
	8		H	72	8		136		,h	200	72
	9		I	73	9		137		,i	201	73
	10		J	74	10		138		,j	202	74
	11		K	75	11		139		,k	203	75
	12		L	76	12		140		,l	204	76
RETURN	13		M	77	13	RETURN	141		,m	205	77
	14		N	78	14		142		,n	206	78
	15		O	79	15		143		,o	207	79
	16		P	80	16		144		,p	208	80
↓	17		Q	81	17	↑	145		,q	209	81
RVS	18		R	82	18	RVSoff	146		,r	210	82
HOME	19		S	83	19	CLEAR	147		,s	211	83
DEL	20		T	84	20	INST	148		,t	212	84
	21		U	85	21		149		,u	213	85
	22		V	86	22		150		,v	214	86
	23		W	87	23		151		,w	215	87
	24		X	88	24		152		,x	216	88
	25		Y	89	25		153		,y	217	89
	26		Z	90	26		154		,z	218	90
	27		[	91	27		155			219	91
	28		\	92	28		156			220	92
→	29		]	93	29	←	157			221	93
	30		↑	94	30		158		,	222	94
	31		←	95	31		159		,	223	95
space	32	32	space	96	32		160			224	96
!	33	33	!	97	33		161	97		225	97
"	34	34	"	98	34		162	98		226	98
#	35	35	#	99	35		163	99		227	99
$	36	36	$	100	36		164	100		228	100
%	37	37	%	101	37		165	101		229	101
&	38	38	&	102	38		166	102		230	102
'	39	39	'	103	39		167	103		231	103
(	40	40	(	104	40		168	104		232	104
)	41	41	)	105	41	,	169	105	,	233	105
*	42	42	*	106	42	½	170	106	½	234	106
+	43	43	+	107	43		171	107		235	107
,	44	44	,	108	44		172	108		236	108
-	45	45	-	109	45		173	109		237	109
.	46	46	.	110	46		174	110		238	110
/	47	47	/	111	47	¼	175	111	¼	239	111
0	48	48	0	112	48		176	112		240	112
1	49	49	1	113	49		177	113		241	113
2	50	50	2	114	50		178	114		242	114
3	51	51	3	115	51		179	115		243	115
4	52	52	4	116	52	¾	180	116	¾	244	116
5	53	53	5	117	53	⅓	181	117	⅓	245	117
6	54	54	6	118	54	⅔	182	118	⅔	246	118
7	55	55	7	119	55	¼	183	119	¼	247	119
8	56	56	8	120	56	⅕	184	120	⅕	248	120
9	57	57	9	121	57	⅖	185	121	⅖	249	121
:	58	58	:	122	58	, ☑	186	122	, ☑	250	122
;	59	59	;	123	59		187	123		251	123
<	60	60	<	124	60		188	124		252	124
=	61	61	=	125	61		189	125		253	125
>	62	62	>	126	62		190	126		254	126
?	63	63	?	127	63		191	127		255	127

Commodore PET™

SOFTWARE PROGRAMS

Program Announcement No.1

OSERO AND REVERSE

Osero is Commodore's version of Othello, a game of strategy played on a 8 x 8 board, much like a chess or checkers board. The object is to surround your enemy and convert the enemy pieces to your side. It's a game where the last moves can be quite decisive; you may be winning tremendously (or losing) but the positions can be reversed at the very last moment. You play against the PET brain.

Reverse is another game to tax your intelligence and logic. The numbers 1 through 9 are on the screen in random sequence. The idea is to put these numbers into order in as few moves as possible. Your logical thinking will get quite a work-out.

Both games are for adults and older children. 8K of RAM is required.

Order Part No. 321001 $10.95

DIET PLANNER AND BIORHYTHM

Diet Planner (by Les Palanik) first determines the ideal weight for your height, your age, your sex and your body frame. It then asks for your level of physical activity. Then it calculates precisely the number of calories you need each day to maintain whatever weight you indicate. Should you wish to lose weight, your PET will display the caloric intake required and the physical activity, on a day by day basis, to help you reach the desired objective. It works.

Biorhythm will indicate your intellectual, emotional and physical cycles according to a well regarded series of computations based on behavior. Enter your name, your birth date and then indicate which 39 day period you're interested in. On an accurately drawn chart, the display will show the highs and lows for each of the three cycles: intellectual, emotional and physical. You should know, on a given day, that all three cycles may very well be at peak. Perhaps that would be a good day to undertake new ventures . . . Fascinating.

Both require 8K of RAM.

Order Part No. 321002 $15.95

TARGET PONG AND OFF THE WALL

Target Pong. Insert paddles in the path of a fast moving ball to deflect the ball into a target. The secret is to use the fewest number of paddles and the least time to hit the target just once. It's really much more difficult than it sounds. It requires dexterity and guarantees you fun.

Off The Wall is exactly the opposite. Here the secret is to use as many paddles as you can without hitting the targets. And just to make the game more difficult, there are many targets in this game.

Both are quite suitable for children of almost all ages and for adults, too. There are various levels of difficulty: the size of the target can vary in **Target Pong**; the number of targets can be increased in **Off The Wall**. Both games can keep score for two players. Requires 8K of RAM.

Order Part No. 321003 $10.95

A TREASURE TROVE OF GAMES

Lunar Lander—one of the all time popular favorites. You must make the Lunar Excursion Module land softly on the moon. By regulating the falling speed, the counter-thrust of the rockets and the amount of fuel required, you should be able to accomplish this objective. If you fail, the marvelous graphics will show the Lunar Lander smashing to the surface of the moon. Difficult at first, but fun to master.

Rotate is a puzzle on a 4 by 4 grid. The secret is to arrange the letters in sequence in as few moves as possible. Very tough at first. But it can be done.

Wumpus is a delightful voyage in the imagination, full of fun and quite educational, too. You're required to be a detective on a treasure hunt. The clues are all given and you must find the Wumpus, on the basis of these clues, and get him before he gets you.

Tic Tac Toe. See if you can beat your PET at this old reliable game.

These games and puzzles will particularly fascinate the younger people in your family . . . although we think adults will like to play along. Requires 8K of RAM.

Order Part No. 321004 $10.95

BASIC BASIC (By Ralph James and Ron Lodewyck)

A real tutorial program, introducing you to the BASIC language. Thoroughly interactive: your PET will teach you how to operate your PET! You proceed at your own pace. You should actually be able to learn PET's BASIC in several hours and then begin your own programming. Basic BASIC is written by two very experienced college professors. The topics covered include line numbers, variables, strings, arrays, and the use of the various commands such as LIST, RUN, and SAVE. Also basic keywords will be explained and used such as PRINT, READ/DATA, INPUT, IF/THEN, GOTO, and FOR/NEXT. Fifteen chapters, six sample programs . . . and homework assignments.

Uses just 4K of RAM memory.

Order Part No. 321005 $15.95

March 1978

Commodore PET™ SOFTWARE PROGRAMS

GALAXY GAMES (By Peter Ruetz)

Here are two tough but entertaining games. In both, you're required to maneuver your space ship while firing at the enemy, and at the same time, to avoid hitting a star. In one game, you're firing at fixed targets. In the other game, you're firing at a spaceship that's being piloted by an obviously drunk astronaut! Absolutely no accounting for the gyrations the enemy spaceship is going to take.

Requires 8K of RAM.

Order Part No. 321006 $10.95

MORTGAGE

Almost a misnomer, because this program is suitable not only for people considering buying or selling property but also for anyone contemplating borrowing or lending money. Enter the principal amount, the term and the annual interest rate and the PET will compute the periodic payments, the total payments and the total interest for your mortgage. You enter the starting date and the PET will display monthly, quarterly, semi-annual or annual payments. The status of the mortgage (or loan) at any date can then be displayed, showing the interest/principal split of the previous payment, the interest, principal and total paid thus far and still outstanding and the number of payments remaining.

Ideal for home owners and borrowers, real estate people, banks. Requires 8K of RAM.

Order Part No. 321007 $15.95

DRAW POKER

Perhaps we've been minimizing the quality of the superb graphics available in all these programs. But with **Draw Poker** and with **Black Jack** (the next listing) you have perfect examples of the kind of graphics we're talking about. Here you play Draw Poker against the house with two pair or better to win. And we must give you a warning: the house is a very tough—but fair—dealer. Of course, the house is your PET. You can vary your bet and see how much you can win (or lose).

Requires 8K of RAM.

Order Part No. 321008 $10.95

BLACK JACK

Place your bet and watch your PET deal out the cards as you try to beat the house. You'll swear you're in Las Vegas. Each card is shown, with the aid of the superior PET graphics, as close to life-like as you can imagine.

Requires 8K of RAM.

Order Part No. 321009 $10.95

SPACE FIGHT (By Leonard K. Sweatman)

Fire missiles at each other in this two player game. But, there's a warning: each missile has limited range and if the missile doesn't hit the enemy, watch out! You could run into your own missile and lose . . . and feel very silly.

A game for all ages. With emphasis on the younger people. Requires 8K of RAM.

Order Part No. 321010 $10.95

* * *

This brings us to the end of our March offerings, an historic event. This is the very first time that programs have been offered for the PET computer. But we promise you that there will be many more releases next month and in the months to come. Commodore has every intention of offering one of the most complete libraries of programs that has ever been offered anywhere.

You might want to use the very handy order form we're enclosing.